Fig. 22. The brain from the ventral aspect, nat. size.

23. The roots of the 5th, 7th, and 8th nerves, from the left side, nat. size.

References to Figs. 20–23.—*a*, elevation on inner wall of prosocœle; *aula*, remains of the cavity of the unpaired cerebral vesicle; *b*, elevation on floor of prosocœle; *b.opt*, basi-opticus (=ventral portion of mesencephalon); *ch.plx*, choroid plexus; *dien*, diencephalon (=thalamencephalon); *di.cœ*, diacœle (=third ventricle); *cpen*, epencephalon (cerebellum); *for.M*, foramen of Monro; *hyp*, hypophysis cerebri; *mes.cœ*, mesocœle; *meten*, metencephalon (=medulla oblongata); *mt.cœ*, metacœle (=fourth ventricle); *optcn*, optencephala (=optic lobes); *prosen*, prosencephala (=cerebral hemispheres), united into a single cerebrum; *prs.cœ*, prosocœle (=lateral ventricle); *rhinen*, rhinencephalon; *rh.cœ*, rhinocœle; *tel.vase*, tela vasculosa; *vel.int*, velum interpositum; *i.–x.*, cerebral nerves.

PLATE VIII.

Carcharodon rondeletii (fœtus).

Fig. 24. The cranium from the dorsal aspect, nat. size.

25. The cranium from the ventral aspect, nat. size. *font*, fontanelle; *a.s.c*, *p.s.c*, *h.s.c*, elevations of the anterior, posterior, and horizontal semicircular canals; *h.m*, facet for the hyomandibular.

26. Outer view of the right auditory capsule, nat. size. *h.m*, facet for the hyomandibular; *h.s.c*, elevation for the horizontal semicircular canal; *spir.cart*, spiracular cartilage.

27. The ventral region of the branchial skeleton, nat. size. *b.hy*, basihyal plate; *b.br.* 2, *b.br.* 5, basibranchial of the 2nd and 5th arches; *h.br.* 2, *h.br.* 4, hypobranchials; *c.hy*, ceratohyal; *c.br.* 1, *c.br.* 2, *c.br.* 5, ceratobranchials.

28. Posterior extremity of the vertebral column showing the last three true centra and the terminal demi-vertebra, ×5.

29. The brain from the dorsal aspect, nat. size.

3. On the Habits of the Tree Trapdoor Spider of Graham's Town[1]. By the Rev. NENDICK ABRAHAM.

[Received November 15, 1886.]

Among the very numerous species of Arachnida which are found through the Cape Colony there are several kinds of Trapdoor Spiders. There is a species which, for convenience, I have called the Tree Trapdoor Spider, about which I wish to give some notes. I have been unable to find any mention of this particular Spider in any of my books, or in any I have access to, and it has been until now unknown to our local or colonial naturalists, so far as I have been able to learn. Thinking it may be known to this Society, I have not presumed to name it; but having very carefully observed for many months this wonderful creature, I send you these notes.

Unlike other Trapdoor Spiders, these build their houses in trees. There are certain trees which are more favourable for building-purposes than others, though the trees chosen are various, but in each case the trees have a rough bark. The house is a very wonderful structure, though small, measuring not more than one and a half

[1] Communicated by Dr. A. Günther, F.R.S., V.P.Z.S., who stated that the Spider in question appeared to be *Moggridgia dyeri* (O. P. Cambridge, Ann. & Mag. Nat. Hist. (4) xvi. p. 319, pl. x. 1875).

inches in depth. The house is not a burrow, though the spider often takes advantage of holes and deep crevices; but usually it is constructed on the surface of the bark, especially if there are lumps or prominences near the chosen spot. The spider commences to build by weaving together pieces of bark and other substances found in the immediate neighbourhood of the proposed house. This part of the work is so skilfully carried out that, when complete, it is almost impossible to detect any difference between the house and the surrounding bark. I have often placed a piece of bark in the hand of a friend and asked that the house might be pointed out to me, and this often proves a very difficult task. I know of nothing in Nature to surpass this wonderful structure, so far as it is an imitation. I have had several of these spiders under observation for many months, both in their natural haunts and in captivity. Being anxious to know how the doors of their homes are constructed, their doors being the most wonderful part of the structure, I procured a piece of old stump from a tree and drilled several holes into it through the different kinds of surfaces presented on the bark. Into each of these holes I introduced a spider; they remainded quite quiet and almost motionless during the day at the end of the hole, but on visiting the stump the next morning, I could not find the holes until I had made a careful search. I then found that a beautiful door had been constructed over each opening, and that each door had been made to correspond with the immediately surrounding surface. One hole had been drilled through a growth of lichen; the door in this instance was made to correspond so perfectly that the lichen looked undisturbed, and only after careful inspection could the outline of the door be detected. In another instance some little pieces of wood, left by the drill on the border of the hole, were woven into the door. At first the covering to the opening is very thin, like paper, its thickness being increased by numerous layers of silk being added to the inside surface of the door. In this way the sides of the house are strengthened, the whole being very strong when completed. In a few trees where circumstances are favourable a number of these wonderful houses are to be found, but only by an experienced eye. In exploring an old tree some months ago, I found, high up in the tree, the remains of a large broken branch. This branch had been split down, and then torn or cut away, leaving a trunk attached to the tree, showing a transverse and a longitudinal section; this latter surface of the trunk had been softened by rain and atmosphere, and formed a splendid field for these spiders to build upon. On a surface measuring 18 inches by 9 I counted 20 houses, not all tenanted, some of the spiders having died or met with violent deaths at the hands of their enemies. I secured this trunk, and now have it in my possession. It is an interesting fact that this tree and nearly all the trees on which I have found the spiders grow in the High Street of Graham's Town, these trees being oaks and "Kaffer-booms." The spiders for years past have been able to look out of their little doors upon the busy world, and no one knew they were there, until an old friend of mine, who spends

much time in smoking under one of these trees, saw an open trap, and drew my attention to it, and then they could be secreted no longer, for I searched every likely tree and made them my special care and study for some time.

I have in my possession two or three houses in which the doors have undergone modifications to meet the size of the spiders now residing in them. A small individual will sometimes take possession of the empty house of an adult; the new comer finds the door too large, so constructs another in such a way as to form a smaller opening; thus some houses have two doors: I send you a specimen.

On attempting to lift the doors of these houses, the spiders hold them down with great firmness. Knowing that naturalists are uncertain as to the means used by the ordinary Trapdoor Spiders for holding down the traps, I have taken special care to observe the mode adopted by those which inhabit the trees, and I find that the hooks of the mandibles, which are barbed, grasp the door, and the legs the side of the house. I am quite sure that this is the case, for I have observed carefully, and in one instance, when the spider held on tenaciously, I was enabled to fix open the door and observe with a lens, and then to lift out the "fangs," which were buried deep in the silken door. I have often found the doors fastened down and not held. They are fastened by strong weavings of silk, which must be broken before the door can be lifted; in all such cases the spiders do not appear to be active or to assist in keeping down the trap. Perhaps at such times the spider is engaged in changing its skin, and, in cold weather, hybernating.

Being anxious to see the spider capture its prey, I put a few grains of sugar near one of the doors. Two flies lighted on the sugar, and while they were regaling, the trap was thrown open with a slight click, the spider darted out, caught one of the flies and retired; the whole transaction was done with such rapidity and dexterity that the other fly, though nearly touching the captured one, was undisturbed and seemed to be quite unconscious of the fate of its companion. I have observed one other capture, and this also was carried out with the same extreme rapidity. The spiders are probably nocturnal in their habits, though I have never seen them out at night, but I know that the work of building goes on during the night. The captures I observed were during the day. It may be that they work at night to save themselves from detection from some of their enemies, and watch for prey both day and night.

The eggs are placed in a small silken bag at the bottom of the nest. When the eggs are hatched, the young live for several months a free life in the home of the parent, and are thus protected from the ants which infest the trees, until they are strong enough to build for themselves; this they do while they are yet very small, but not until they are several months old. The greatest enemies these spiders have are the ants; but the houses are so strong and so much like the natural bark that even the ants would not work them much damage if they did not catch them, or enter the house accidentally. On old trees I have found nearly all the houses without spiders, but

many tenanted by other insects in various stages of transformation. Like other spiders, when one meets another there is a fight, which often ends in the death of both.

The spider itself is a very interesting creature. It is about five-twelfths of an inch in length; its legs are short, strong, and flattish. The head carries eight simple eyes; the maxillary palpi of the female are leg-like and hooked. There are four stigmata. The colour is nearly black. The abdomen is not large in proportion to the rest of the body, and bears at its extremity four spinnerets, two large and two small.

I send with this paper specimens of the houses and also of the spider. In all cases the houses do not look so well, neither are they so perfect as when fresh cut from the trees; this is partly owing to the shrinking and twisting of the bark in drying. If I can give any other information respecting this spider, or if it would be acceptable to you for me to send other accounts of personal observation, I shall be pleased to do what I can, according to the limited time I have for this, my favourite pleasure.

4. Notes on the Visceral Anatomy of certain Auks.

By R. W. Shufeldt, C.M.Z.S. &c.

[Received November 12, 1886.]

About two years ago the Smithsonian Institution of Washington placed in my hands for anatomical description a fine collection of bird-skeletons, amounting to nearly a hundred in number, that had been collected by American explorers at different times and at several localities in the Arctic regions. My researches upon this material will quite fill a volume, and are illustrated by several hundred original drawings, the whole being in charge of the Smithsonian Institution for publication. When I received this collection it was accompanied by a few selected alcoholic specimens of Albatrosses and Auks, sent to me with them in order that I might obtain skeletons that were not to be found among the rest of the material, my work having chiefly to do with the osteology of the groups represented. Among the spirit-specimens of the Auks I found one of each of the two interesting forms known to us as *Brachyrhamphus marmoratus* and *Synthliborhamphus antiquus*, or the Marbled Murrelet and Ancient Murrelet respectively. These birds rarely fall into the hands of anatomists in such good condition as these were; and although I only needed their skeletons for the purpose I had in view at the time, I nevertheless took the pains to carefully remove certain parts of their visceral anatomy, and again placing these parts back in the alcohol, I have them now before me for examination.

My surprise was very great to find in these two forms, supposed to be very closely related generically, how very different the corresponding structures and organs occupying the chest and abdomen really were. Some of these differences will be readily appreciated by simply